BOSTON MECHANIC,

AND

Journal of the Useful Arts and Sciences.

JUNE, 1835.

ACCOUNT OF HARVARD COLLEGE.

[Furnished for the Boston Mechanic.]

Perhaps we cannot wish a better wish for our country, than that it may abound with liberal, excellent and christian institutions of learning. Everywhere schools mark the progress of civilization, from the rude bungalow school of half civilized and pagan India, to the noble Universities of the liberal arts and sciences in enlightened Europe. Our forefathers felt the need of them, when, as one of the first acts of their political and civil existence as a people, they founded Harvard college, the first, probably that ever reared its domes on the whole continent of America. They knew, very well, that without education, not only of the head but of the *heart* also, that freedom which they so dearly loved, and so earnestly strove to secure to their posterity, would avail them nothing. They knew that the freedom of ignorance and blindness is the most degrading despotism—the bondage of the noblest part of human nature to the most absolute of tyrants, passion and self.

It is no argument against colleges, that they serve to educate the rich, while they let alone in their ignorance the poor; or that they serve to fill a few men's heads with high, aristocratic or foolish notions. These, at most, are only abuses of the privilege of possessing such institutions, and the consequences of superficial and partial education. The first of these objections is groundless, because there are charity scholarships in our colleges; the second needless,

because a proper education actually results in making the subject of it in every way a better member of society.

A mechanic may care little for a college; for the mechanic arts are not taught there, and the Greek and Latin he does not need. But he judges wrongly, nevertheless; for the scientific principles, on which many of the mechanic arts depend, and by an examination of which they are improved and perfected, are taught there. If the proper studies are not taught in colleges, if many things which ought there to be done are left undone, this is no argument against the excellence of the institution, but an error which ought as soon as possible to be rectified. However, we feel assured that our colleges do teach sound principles of science and general knowledge, proper to fit men for the duties which they may be called upon to perform to society.

We proceed to give a short account of Harvard University, the first American college, for which we are indebted to Mr. Woodbridge's Annals of Education. The plate we are favored with by the publishers of the American Magazine.

It was in 1636, only six years after the first settlement of Boston, that the General Court devoted four hundred pounds to the establishment of a college at Newton, afterwards called Cambridge. A generous bequest, from the Rev. John Harvard, of his library, and half his estate, led the overseers to give his name to the college, and the extension of the course of study has led to the title of Harvard University.

In 1638, the regular course of academical studies was commenced. A preparatory Grammar School was soon opened, and the first printing press in this continent, north of Mexico, was established in connection with the College, in 1639. This press acquired much celebrity for the number of works it issued, especially for printing the first books in the native language of our Indians.

During the whole of the last century, the instruction of the College was conducted entirely by the President, the Professors of Divinity, Mathematics, and Oriental Languages, and four tutors; but as early as 1766, the tutors were appointed, each to a distinct branch of study, thus rendering them in effect, temporary Professors. There were, in 1834, ten Professors and as many tutors, employed in instruction in the College.

The University is provided with a library of 40,000 volumes, the largest and most valuable in our country, and probably the richest in the world in works relating to America; a valuable cabinet of minerals, and a philosophical

and astronomical apparatus which is said to surpass any other in the United States. A botanical garden, a fine collection of anatomical preparations and models in wax, and an ample chemical apparatus, are also provided, for instruction in the natural sciences. Connected with the College are a Law and Medical School, the latter of which is established in Boston.

The whole amount of property vested in this University amounts to $619,347 19—of $120,000 of which it is only a trustee. The income of $53,000 is devoted to the Theological and Law Schools, and $80,000 to the salaries of professors in the literary department. The following remarks of Mr. Woodbridge, with which we close this account, are well adapted to the refutation of the objections to colleges to which we alluded, in the commencement of this account.

'The attempt is often made, to represent our colleges as intended and adapted to restrict the acquisitions of learning to the children of the rich, and every endowment as a provision for sustaining the power of an aristocracy. But how is science to be taught without books and apparatus? How, on the present plan, are students to be lodged without buildings? and how can they be well taught, and disciplined, unless the ablest men are secured for the purpose, by a remuneration equivalent to that which they would receive in other employments? The truth is, every student in most of our colleges receives instruction at less than its actual cost; and every endowment, is but a provision for diminishing his expenses, or increasing his means of improvement. Instead of favoring an aristocracy, the obvious effect of a fund is, to give the indigent a better opportunity of rising to the highest stations in society which learning can secure; and such has been their effect in numerous instances.

The accounts of the Treasurer of Harvard University happily afford decisive evidence on this point. From the last report, it appears, that the salaries of the officers in the literary department only, amount to $24,850 73, and the current expenses of the institution, arising from the care and repairs of the buildings, and other charges connected with the accommodation of the students, (not including board or purchases of any kind,) form an additional sum of $11,853 43. The whole amount received from students to meet these expenses, is stated to be $20,954 63, leaving a balance of $15,749 43 to be paid from the income of the funds, which are thus employed in *diminishing the expenses of the students.* If to this sum, we add the interest of the funds invested in

the buildings, library, and apparatus—all of which are *indispensable* to the students, either for residence or instruction—we shall find, that *each young man receives twice as much from the institution as he pays for his lodging and tuition.*'

THE IRON BOATS.

[Furnished for the Boston Mechanic.]

We gave some time since, under the head of Fly Boats, an account of the swift passage boats on the Scottish canals. The circumstance of the comparative ease with which they are drawn at high velocities, and the diminished resistance and wave caused in the water at such velocities, has been a matter of interesting speculation.

It is not to be inferred that the draught is actually *less* at high velocities than at low ones, but less in proportion to the velocity. That is to say, it does not require quite three times as much force to draw a boat three times as fast; so that the passage may be made three times as quick, without incurring so much as three times the expenditure of strength.

The cause of this result appears to be the following:

1. The boat does not sink so deep in the water when going with velocity, so that its resistance from the water in front is less, having a less weight of water against it, when raised partly out of the water. This is on the principle that the forward velocity, for the time being, diminishes, or rather counteracts the force of gravity, in the same manner as the centrifugal force does in the revolution of a circular body, or as the skater, when going swiftly, is able to pass safely over places where, if he stopped for a moment, his weight would inevitably carry him through the ice.

2. The wave, which rises before the boat when moving slowly, and resists it strongly, sinks beneath it when its velocity becomes greater. When urged to a certain speed, the boat drives over the wave already raised, at beginning to move, before it has accumulated, and continues to go on rising part way out of the water and passing over, (being light built,) faster than the inertia of the water will permit it to be heaped up by the pushing of the boat against it. Thus in driving a vehicle, at a low velocity, it will stop suddenly against some obstacle which might lie in its path, whereas if driven swiftly, it would be overcome. So, appar-

ently, the boat is enabled, when at a high velocity, to clear itself of any wave that might begin to rise before it, being, in fact, partly supported by the draw rope itself. The following curious circumstance deserves to be considered in connection with this. It is from a letter to the Editor of the Railroad Journal, concerning the Paisley Canal.

'The time usually employed between Glasgow and Paisley is 50 minutes, or $9\frac{2}{3}$ miles per hour. This is the narrowest canal I ever saw, generally 30 feet wide and 5 feet deep. The captains of the boats on board of which I travelled, told me that on a narrow canal, such as this, the horses can pull a boat easier, *when travelling rapidly*, than on one of greater section. This, paradoxical as it may appear, is verified by the fact, that on the Forth and Clyde canal, which is of 9 feet depth, and 68 feet breadth, the boats, which are of nearly the same dimensions (68 feet long, and $5\frac{1}{2}$ feet broad) as those on the Paisley canal, are drawn by *three* horses, with 70 passengers on board, and yet travel at about the same velocity as on the narrower and shallower canal. I asked these captains, and also a civil engineer of some eminence, whom I met on board, returning from Johnston, how they could account for this circumstance. Their reply was as follows: On a narrow canal, say 30 or 40 feet wide, the boat passing swiftly through the water, throws the wave against the shore, which being thrown back against the boat, raises it up, and thus propels it. The wave strikes the boat about two-thirds of its length from the bow. But if the canal were much wider, the boat would pass by before the *reflected wave* could reach the boat, and thus give it aid.'

MATERIALS OF ART AND MANUFACTURE.

[Original.]

We can but wonder at the ingenuity of man, who has devised such a vast variety of expedients to increase his comforts, or to supply his wants. Not satisfied with one, or a few means, even, for accomplishing one purpose, he ransacks the globe perpetually for new devices, as though intending to be sure, when one shall fail, of the possession of others. The variety of materials, drawn from the three kingdoms of nature, is wonderful, which man has been able to convert into agents for promoting his own ends, and ministering to

his convenience. In every different country, even, we find different manufactures, and different materials of produce wrought. So truly does the world appear to have been made for the use of man; for while other creatures can make use of but a very small portion of its resources, and its treasures, and are confined to districts, sometimes limited ones, of its vast surface, man alone, ranges over its whole domain, seeking habitations in every quarter, and making use of almost everything that grows or lives upon it.

The following is a list of some of the principal materials employed in the useful arts and manufactures.

From the Animal Kingdom.

Hides and Skins, of various animals.—For leather and parchment.

Horns of animals.—For combs, &c.

Ivory and Bone.—For combs, handles of knives, and a great variety of instruments.

Hair and Furs.—For mattrasses, hats and articles of dress.

Wool and Silk.—For the most valuable cloths.

Tortoise Shell.—For combs and ornamental work.

Glue.—For cementing wood, &c.

Whale and Sperm Oil and Spermaceti.—For burning in lamps, &c.

From the Vegetable Kingdom.

Woods.—Mahogany, Oak, Pine, Cedar, Bamboo, &c.

Barks of wood.—For tanning, &c.

Fibrous Materials.—Hemp, Cotton, Flax, and various fibrous barks, Paper Mulberry, Cocoa-nut husk, Mexican Aloes, New Zealand Flax, from which are manufactured cordage, cloths, and ultimately, paper.

Seeds and Fruits.—From which oils are obtained, for various uses, especially olive and linseed oils.

Gums, Resins and Turpentine.—Employed for varnishes, &c.

From the Mineral Kingdom.

Metals.—Iron, Gold, Silver, Lead, Tin, Copper, Antimony, Zinc, &c.

Stones.—Marble, Limestone, Soapstone, Granite, Freestone, &c.—for building, and architectural ornament.

Precious Stones.—Diamonds, Topaz, Ruby, Agate, Crystal, &c.

Earths.—Clay, fine, for pottery; coarse, for bricks: Sand, &c., for glass: chalk, &c.

Minerals.—Copperas, Alum, Nitre, Sulphur, Ochres, and a great variety of other minerals, too numerous to mention.

This is but an outline of the materials of art and manufacture. We intend, if it shall be convenient, to give an account of some of these materials, at large, and of their manufactures. The arts, increasing as they ever do, with the progress of civilization, cannot but be interesting in every point of view, to the intelligent population of a civilized nation.

COOPER'S PATENT STOPPERS.

[From the London Mec. Magazine.]

The accompanying drawings represent a view and a section of an inkstand, constructed on the principle of Mr. R. B. Cooper's patent for improved stoppers.

These stoppers are particularly applicable to bottles of every description for medical and chemical purposes, smelling bottles, inkstands, decanters, and jars for pickles and preserves, either in stoneware or glass, with suitable mounts and fastenings. From the great simplicity of these stoppers, it is quite impossible that they can ever get out of order, either by the stopper breaking in or setting fast, which is well known to be an endless source of complaint with the conical glass stoppers of ordinary construction, and unfortunately this evil increases in proportion as they are better ground. None of these inconveniences can occur with Mr. Cooper's stoppers, although they are so accurately fitted that they will preserve the most volatile spirits—even ether—in any climate. They are easily and quickly opened or shut; and for all the purposes enumerated above, as for many others of the like nature, surpass in efficiency all the other contrivances hitherto before the public.

The peculiarity of Mr. Cooper's patented invention, consists in using a hemispherical glass stopper, A, which is very accurately fitted, by grinding, to the cup B, in the mouth of the bottle. The cap containing the stopper, screws on the metal collar D, attached to the neck of the bottle, and when slightly screwed down, renders the joint perfectly air-tight. An elastic substance, C, is introduced between the stopper and the cap, for the purpose of rendering the action more easy and agreeable.

DIFFERENT METHODS OF MEASURING TIME.

[Furnished for the Boston Mechanic.]

We are much obliged to our correspondent for this communication, especially for his practical remarks, to which the subject leads, and which we think calculated to be beneficial. We shall be happy to hear from him again.

A certain degree of accuracy in the measurement of time, is of importance to the mechanic, the student, the man of business, and to almost every person, for the proper distribution of their labor. As there are several kinds of time, differing very materially from each other, we shall offer a short and simple description of them, and of their several merits and defects.

Sidereal Time.—The interval between two successive passages of a fixed star over the meridian, or over its highest point in the heavens, is always the same, or never varies more than half a second, and is called a sidereal day. A clock, regulated so as to move equably through twenty-four hours, from the beginning to the end of a sidereal day, keeps sidereal time. Astronomers employ this time for a few purposes, but it has never been introduced into any community for the regulation of its labor or pursuits, and in fact, would be but poorly adapted to the necessities of practical men.

True Solar Time.—The interval between two successive passages of the centre of the sun over the meridian, is a solar or common day, and a clock which points to twelve when the sun is on the meridian, and moves regularly through twenty-four hours in the course of a solar day, keeps true solar time. This sort of time is frequently called by astronomers apparent time, and is also known by the names of civil time and common time. Now, the interval between two

successive passages of the sun over the meridian, is not always of the same length. During some portions of the year, the apparent motion of the sun is accelerated, so that it comes to the meridian each succeeding day, part of a minute sooner than it would were its motion always the same. It is less than twenty-four hours from noon to noon in such divisions of the year, by this part of a minute. During other portions of the year, the apparent motion of the sun is retarded; so that it arrives at the meridian, each succeeding day, part of a minute later than it would were its motion uniform, and from noon to noon at such times, it is more than twenty-four hours by this part of a minute. Such being the case, the old fashioned saying, 'the days and nights are as long at one time as at another,' is not exactly correct; a day and night together at the twentieth of September, being about a minute less than a day and night at the twenty-fifth of December.

Mean Solar Time.—The inequality of the solar days, which we have just mentioned, caused by the irregularity of the apparent motion of the sun, although they are so small as to be unnoticed by people in general, are nevertheless of such consequence to the astronomer as to hinder him from taking true solar time to show the moment of his observations. Neither does sidereal time answer his purpose. He is under the necessity of using a kind of time uniform, to be sure, but which shall differ as little as possible from that generally employed, in order to be easily understood. Astronomers have, therefore, imagined a fictitious sun, which passes the meridian in exactly regular intervals, about as much before the true sun in some parts of the year as it is behind it in others. A mean solar day is contained between two successive passages of this false sun over the meridian, and is as long as the general average of the true solar days. A clock that moves regularly through twenty-four hours in a mean solar day, keeps mean solar time. This kind of time is employed at present in the city of Boston, and in several other places. Its use has not been attended with any very great inconveniences, although it is not so well suited to the wants of people in general as true solar time.

An accurate clock, say one that does not vary more than a second in twenty-four hours, is better fitted to keep mean solar time, to be sure, than the true. When set to the latter time, it wants a rectification every day of several seconds, to make it conform to the unequal motion of the sun; whereas when set to mean solar time, which is perfectly

uniform, it can be incorrect only from the inequality of its own motion. There are few timepieces, however, of this description; the great majority of them vary from perfect regularity at least half a minute in twenty-four hours. As the apparent motion of the sun is not, in general, accelerated or retarded more than a fourth part of this quantity during the same time, an ordinary clock can be as easily regulated to true as to mean solar time. Such being the case, the advantages which one may suppose mean time to possess over the true, vanishes, at least so far as common purposes are concerned. On the other hand, we find many disadvantages attending its use. People generally labor, and do business, during the day, properly so called; that is, during the time of the continuance of light. When noon is indicated on their clocks, they call it the middle of the day; but if their time-pieces are set to mean time, they judge properly only four times in the year—on the 25th of December, the 16th of April, the 16th of June, and the 1st of September, when true and mean time coincide. At all other periods of the year, mean noon will come either before or after noon. During a large part of the month of February, it arrives nearly a quarter of an hour before, and in a considerable portion of October and November, it comes about a quarter of an hour after. Now, as noon according to true time is in the middle of the day, in the former case, the time between sunrise and *mean* noon, is half an hour less than between mean noon and sunset, and in the latter it is half an hour more. At other times of the year, the difference between the forenoon and afternoon, when we reckon according to mean time, is less, but is still, in general, of considerable importance.

Suppose again, a man wishes to find when the sun rises or sets. He examines his almanac, where the true time is registered, and then observes his clock; if this indicates mean time, a certain number of minutes and seconds, which varies from day to day, must be added to this time or subtracted from it, in order to tell the exact period of the rising or setting. These minutes and seconds are found in a column of most almanacs, together with explanations sufficient to enable any one to use them. Still the necessity of always making an addition or subtraction of a variable quantity in cases like the above, is very troublesome and perplexing, and when taken in connection with the disadvantages we have named, as well as some others, shows that mean solar time is not well adapted to the common purposes of life.

We advise every man, who wishes to be regular in his hours of labor, to set his clock to true time, and regulate it by a noon mark or a good sun dial. We say a *good* sun dial, because those for sale in the shops, made perhaps for the latitude of London or New York, though costly for such simple things, cannot be depended upon.* If this article should attract the attention of the people to the subject, we perhaps may give a concise and simple description of the manner in which an accurate sun dial can be very expeditiously constructed, for any latitude in the vicinity, by a common mechanic.

Before finishing our remarks, we wish to describe to the public a practice which is very common, and we believe almost universal in our manufacturing establishments. During the fall and winter, the operatives are called out to commence their labors as soon as the light will permit, and according to the terms under which they engage, are to be dismissed at a certain time in the evening. The officers of the several establishments, in these seasons of the year, set the clocks so as to detain the laborers from a quarter to a half of an hour later than the terms of their engagement. The truth of this practice has lately been called in question, on account of some incorrect assertions concerning it, but is now admitted by all. We would suggest the propriety of its total renunciation. It is deceitful and unjust; it is generally known to the operatives, engenders ill will, and as far as deception is concerned, fails to produce its intended effect. From the highly honorable character of those whom we at this moment particularly address, we have no doubt that these hints, though they come from so humble a source, will meet with prompt and deserved attention.

SHAGREEN.—Shagreen is made of the skin of the buttocks of horses and mules, which is well tanned, and rendered as thin as possible; it is pressed for a certain time, and then strewed with the finest mustard seed.

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* The style, or wire of a dial, the shadow of which shows the hour, must be regulated in height according to the latitude of the place where it is used.

AMERICAN PATENTS.

[Abridged from the Journal of the Franklin Institute.]

PATENT *for an improved Gas Metre;* James Bogardus, New York City, October 7.

Its exterior form is that of an oval shade, such as is put over time-pieces, the longest diameter of which is about nine inches, its shortest six or seven, and its height fourteen. This exterior part is to be made of cast iron, in two pieces, being divided by a vertical plane passing through its longer diameter, flanches being cast along its edges, to allow the two halves to be united by means of screws; this vessel has a bottom, so as to form a perfectly close box, and it stands upon short feet. On the front side of it there is an opening, formed in the casting, which is filled with glass, cemented in, air tight, and affording a view of the index, and of the general operation of the machinery contained in the interior. In the lower part of this case there are two openings, one for the introduction of the gas from the reservoir, and another to allow of its exit to supply the burners.

When the two shells are put together by their flanches, they are made to embrace a flexible diaphragm of bladder, or air tight cloth, which is loose or bagging in the interior, so that when the gas is forced in one side, the diaphragm will pass over to the other, and come into contact, or nearly so, with the shell. The induction and exit apertures above spoken of, are connected with pipes, which are cast on to the bottom, and are so constructed that they can communicate with either side of the diaphragm, there being a movable cup or cover, which is shifted at every vibration, thus producing an effect resembling that of the slide valve of a steam-engine. The diaphragm, of which we have spoken, is in part embraced between plates of sheet tin, leaving its edges and upper part free to obey the pressure of the gas admitted; this sheet tin works on pivots at the lower end, and can, consequently, vibrate backward and forward with the diaphragm.

When the gas is admitted on one side, that on the other is forced out, by the action of the diaphragm upon it, and this, at the end of its vibration, reverses the communications between the induction and exit pipes, causing the gas to be admitted and discharged from the opposite sides. The same vibrating diaphragm acts also upon the wheel work by which the indices are moved, which point out the quantity of gas which has passed, by counting the vibrations, as one must necessarily be a measure of the other.

The applicant contemplates the application of this instrument to current water in all aqueducts, where, as in the use of gas, the quantity of

water used or delivered, is to be ascertained. He contemplates the use of it, also, to the discovery of leaks in gas pipes, and in water pipes laid in the ground, and to the measurement of wines and liquors, when running into hogsheads, casks and barrels, by combining an instrument constructed on this principle with a syphon.

PATENT *for improvements in Locomotive Engines and Cars for Railroads;* Matthias W. Baldwin, Engineer, Philadelphia, September 10.

The following are the several statements of the improvements for which a patent right is claimed.

'What I claim as my improvement in the respective parts of locomotive engines and cars, herein described is, first, the manner of constructing the crank, and inserting the wrist thereof, prolonged, into a socket in the wheel, or otherwise attaching it thereto, for the purpose of obtaining the advantages set forth. Secondly, the casting the wheel with the arms or spokes, separate from each other, and attaching them to a rim or felloes of wood, by separate flanches. Thirdly, the manner of constructing the pump chamber, so as to fix it together without any packing, and to confine the respective parts in their places by means of a stirrup, operating in the manner described; and also, the forming the chamber of the pump itself within one of the parallel guides. Fourthly, the general manner of constructing and adapting the junctures of steam or other tubes, without packing, as set forth; not intending, however, in either of the cases referred to, to confine myself to the precise form and construction represented in the drawings, but to vary the same in any way by which I may be able to attain the same ends by analogous means.'

PATENT *for a Furnace for Heating Bar Iron with Anthracite and Bituminous Coal combined;* Henry Burden, Troy, Rensselaer county, New York, October 14.

The improvements claimed are, 'First, making the furnace with a door at the back end, so as to admit of the bituminous coal being put into the back part of the furnace. Secondly, using the bituminous coal on a part of the grate at the back part of the furnace, reserved for that purpose, which gives the coal an opportunity of ignition, as well as could be by a reverberatory or puddling furnace, before it comes in contact with the iron. Thirdly, in combining the use of anthracite and bituminous coal, for the purpose of heating bar or other iron, at the same time igniting each in separate parts of the furnace.

PATENT *for a Machine for Boring Timber;* Benjamin Knight, Cranston, Providence county, Rhode Island, October 23.

The machine is to be attached by clamps of a peculiar construction, to the timber to be bored. The auger is to be turned by a crank acting upon a bevil gear, and the whole apparatus is so constructed as greatly to facilitate the operation of boring. The claim is to 'a slide placed on the main frame, and capable of being moved from end to end thereof, without removing the frame from the timber to be bored. And also the clamps for the purpose of holding the frame to the timber.'

A CHAPTER ON DYEING.

[Furnished for the Boston Mechanic.]

A BEAUTIFUL, imperishable dye is an article which will never come amiss. A great proportion of the dyes which are in use are fading; others corrode the cloth, on account of the vitriol which they contain, and others, good as they may be, are very dear. Vegetable dyes, perhaps always require a mineral mordant, to strengthen and fix the color; but with this aid, colors otherwise volatile are made permanent. Various materials, it is true, require different dyes, and some imbibe colors with difficulty; yet there is no doubt, that with suitable preparations, all articles may be made to receive permanent dyes.

On account of the absence from the lists of patents for new and improved dyes, there is some reason to suppose either that the subject is in a state of repose, or else, which does not appear very probable, that perfection in the art is already attained. Now although we are not much in favor of spending money in useless experiments, and believe that far too much has already been spent in this way, especially in endeavoring to discover principles in mechanics, and in natural philosophy, which never existed, yet we are of the opinion that there is much room for useful experimentation on vegetable dyes, especially from the productions of our own country. There is no reason to suppose that the natural wealth of our country, in the vegetable kingdom, is fully developed, any more than in the mineral kingdom, in which new and important discoveries are continually increasing our resources.

It is well known to botanists, that there is a kind of grain, (called wild rice,) growing plentifully in marshes, in some parts of our country, which yields more abundantly than any kind of corn which has yet been cultivated. And yet none but birds and Indians have ever made any use of it, although it is a very wholesome and very palatable grain. Why then, in prosecuting our discoveries in regard to the nature and use of plants, which there is reason to believe, have been too much neglected, should we not expect to meet with plants of immense importance in the useful arts, which now grow unregarded and unknown.

There is a species of lichen, growing on trees, of a greenish color, which the country people gather, under the name of moss, which dyes a permanent orange color on wool. It may be gathered by bushels from the oak trees, hanging in bunches from the limbs. Lie or potash, we believe, is used to fix the color. The acrid herb called smart weed, or biting knot-grass, is said also to dye a brilliant and unfading yellow. If these dyes are unknown to chemists, we think they ought to be; and the scientific should not undervalue an important principle, which their science may render five times more valuable, merely because they owe the discovery of it to the ignorant.

It is some time since we read an account of a process for making a blue dye from the stalks of the buck-wheat, by a process so cheap—consisting merely in piling them in heaps till they decay and ferment, and fall into a solid mass—that if valuable, it ought to be known, as certainly little use is now made of the stalks of this plant, which, indeed, is but very little cultivated in this section of the country.

There is one more vegetable color to which we would advert. A gentleman in Canada, it has been said, discovered a scarlet dye, (which if fine and permanent, would certainly be a desideratum,) in the herbage of a certain species of *Galium*, a low insignificant plant, but of which several kinds are very abundant. Unfortunately, it was unknown what was the particular species. There is reason to believe, however, that there are undiscovered dyes in this family of herbs, as dyes have already been extracted from some kinds of *Galium*, and from madder, which is a plant of the same family.

Singular as it may appear, no simple green vegetable dye has ever been discovered, although green is so universal a color in nature; and hardly a mineral one, except verdigris; and almost all mineral colors are poisonous. Indeed, green

is not, as was formerly supposed, a primary color, but always composed of blue and yellow; hence it is rather natural to suppose that we should be obliged to form our green dyes by a mixture of blue and yellow.

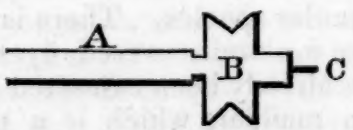
The bruised leaves of the apple tree, diluted with water, give a yellow ink, probably not permanent alone, though it might possibly be made so. The colors of flowers are extremely evanescent, fading as soon as the plant is dried. The flowers preserved by botanists lose all their bright colors, and turn brown or even black, with a few exceptions. Would it not be worth while to test the colors of those flowers which remain permanent in drying, such as the scarlet columbine, the yellows of the butter cup, potentilla, &c., whether these may not be made permanent after extraction.

Perhaps there is not a more interesting or elegant branch of chemistry than its application to the art of dying. Vegetable chemistry, too, is more difficult than its other branches, on account of the greater difficulty of analyzing the delicate texture of plants. The effect of light upon colors is a most interesting field of observation. Hardly any color resists the effects of long exposure to the direct rays of the sun. What light is, perhaps we can never know; but there is hardly a better proof that it is something substantial, than its chemical action. It is hoped that some one will deem these hints worthy at least of being used as a text for the further consideration of the subject; and for the present, we will dismiss it.

TINCTOR.

DRILLING HOLES IN GLASS.

THE following method of drilling glass is taken from the London Mechanics' Magazine, and recommended by the inventor as a very superior method. Why might not the diamond be used, with a circular motion, to cut holes in glass? Or might not a drill be headed with a diamond to bore glass?



MAKE of thick sheet tin a tube three or four inches long, the diameter of which, measuring from the *outside* edge, must be somewhat smaller than that of the hole required. Let this tube be converted into a drill thus:

A is the tube; B the head of the drill, turned out of wood, part whereof goes about an inch into the tube; C is a piece of iron wire for the pivot. The open end of the drill should have a few notches made in it with a file, so as to admit the emery, necessary to work with facility.

Determine the size of the hole you want, say half an inch in diameter; then cut such a hole in a piece of flat wood, being not less than two inches square, and half an inch thick; next mark on the plate glass the situation of the hole wanted; take some melted bees' wax, with or without rosin, and fix the piece of wood on the glass, having the hole exactly over the place previously marked; place the glass on something flat, whereon some baize or carpet has been first laid, to prevent the glass from sliding during the process; mix plenty of grain emery with water, and put it into the open part of the drill; now place the drill in the hole of the wood, and with a breast plate and drill bow, about two feet long, commence drilling. You must work at first very slowly to avoid chipping the edge of the glass, and afterwards proceed at a quicker rate, always taking care not to press on the drill more than sufficient to keep it steadily working, for otherwise there will be great danger of breaking the glass. When the drill is almost through the glass (which may be ascertained by looking at the other side of it,) you must remove the carpet or baize, above alluded to, to obviate the danger of chipping the edge of the hole, and then proceed very slowly until the operation is quite finished. You will thus obtain a clean edged circular hole, with a corresponding piece of glass; and this, without incurring the least risk of breaking. In this way, a piece of plate glass, a quarter of an inch thick, may be cut through in less than ten minutes.

MAKING HONEY.

[Furnished for the Boston Mechanic.]

'WHAT is sweeter than honey?' was one of the riddles with which Samson of old undertook to puzzle his Philistine foes. The little attention paid to the makers of this article, and its consequent dearness, would seem to intimate that in this country, at least, many things are found sweeter.

Honey, used in moderate quantities, is a healthy article of food; and the wax is an article that will ever command a

ready market. Such being the case, we have often wondered why bees were not almost universally kept. A poor man, who can but command money enough to purchase hives, can keep bees. They do not require of him, like the farmer's cattle and horses, to provide them with pasture; neither, like his fowls, do they require their daily food at his hands. Care they will of course require, but it is comparatively little that is necessary. The farmer, indeed, is the one who is expected to be most forward in the keeping of bees; but we sincerely recommend to our friends and patrons, the mechanics, the adoption of this piece of domestic economy; and if it needs must be so, let them set the example to the farmers. We speak of this subject, from a conviction of the utility and profitableness of the business, as well as of the demand that exists of an increased product of the articles manufactured by the bees. We take the liberty to insert some remarks upon this subject by Dr. Smith, of this city, who has had practice in bee-keeping, and who has written an interesting book upon the subject. He is of opinion that bees may be kept, to a considerable extent, even in the city.

'The poorest man should keep bees. Thousands of hives might be well supported in any part of the country, however barren it may appear, yielding a profit altogether superior to moderately cultivated lands. Almshouses should be furnished with extensive apiaries; as the feeblest tenants of such institutions would be perfectly competent to their successful management. After the swarmings have been completed, no further attentions are requisite. Even then, when the young colony makes an exit from the parental domicil, in search of a house of their own, a child might control their apparently erratic disposition, and house them at pleasure, by imitating a shower with a bucket of water thrown into the air. Tin pans, sleigh bells, and countless other equally unmusical instruments, usually brought into requisition on such occasions, are perfectly useless. The bees neither hear the coarse vibrations, nor regard them if they do. To wet their wings is a philosophical, and certainly a more effectual way.'

In our monthly notes, we have inserted an account of an improved bee-hive, which we recommend for trial. We doubt whether any flowers were created 'to waste their fragrance on the desert air,' but rather to produce food for the millions of these winged inhabitants of air, a pasturage for which there is no rent to be paid, and which is almost sure to yield a profitable increase.

UNHEALTHY LABOR.

[Furnished for the Boston Mechanic.]

It is unfortunate, that it should have so been, that any of the arts necessary to man's well being, should have the tendency to shorten the lives of those engaged in their pursuit. There are ways enough, in which man, by his own ignorance, or by his own folly, shortens his days; and we cannot sufficiently deplore that ignorance and folly. But when the very business on which the workman depends for his daily bread is a means of depriving him of a portion of his health, and bringing him early to the end of life, the philanthropist has still greater cause of regret.

The employment of grinding in the cutlery establishments, in England, is stated to be very injurious to the health; never failing when continued, of bringing on fatal pulmonary complaints. The stones on which the grinding is performed revolve so rapidly by machinery, that a few seconds only is required to give edge to a knife or other tool. The particles of steel, fine as dust, are thrown around by the centrifugal force, and are infallibly taken in with the breath, thus continually injuring the lungs.

It has been attemped, and we believe with success, to remedy this by the truly scientific expedient of placing *magnetized masks* upon the faces of the operators, which attract and collect every particle of steel, and thus prevent its entrance into the lungs. It does not appear, however, that this remedy, salutary and effectual as it would appear to be, has been adopted to any extent. It may be that prejudice—the greatest obstacle science and civilization have ever had to encounter—in the workmen themselves, has prevented the general trial of this safeguard.

We have before mentioned (No. 2, pages 39–40) the poisonous effects produced on the workmen upon certain metals, and have indulged a hope that modern science would provide some effectual preservative against the deleterious effect of mineral exhalations. It seems that our hopes bid fair to be realized, as will be seen from the following extract, originally from the American Journal of the Medical Sciences, on a remedy discovered for the diseases to which the workers in lead are subject.

'Some time ago, M. Gendren proposed sulphuric acid lemonade as a preventive against, as well as a remedy for lead colic. M. G. has recently communicated to the

Academy of Sciences, some additional interesting information on this subject. He states that M. Rouard, director of a manufactory of white lead, caused all his workmen to take the sulphuric acid lemonade, and from that moment lead colic ceased to occur among the men in the establishment. During two months, only four workmen were slighly affected with lead colic, and this exception is explained by circumstances peculiar to these workmen. But he adds, that at the same time that these results have confirmed the utility of the measure, as regards colic, six of the workmen were attacked with symptoms hitherto regarded as the effects of lead colic, as cramps, muscular debility, and nervous epileptic symptoms. These symptoms, M. Gendren ascribes to a layer of oxide and carbonate of lead, combined with the epidermis. This observation he considers as accounting for many symptoms hitherto difficult of explanation, and points out the origin of the relapses and symptoms which so often supervene after the cure of colics in workmen habitually exposed to the powerful action of the causes of the disease. He further adds, that whether the sulphuric acid be used as a preventive or remedy, it must be employed externally as well as internally. Conformably to this indication, the workmen in the establishment of M. Rouard, at the same time that they take the sulphuric acid lemonade as drink, apply lotions of the same to the surface of their bodies.

THE SEVEN WONDERS OF THE WORLD.

[From the New York Mechanics' Magazine.]

1. The brass Colossus of Rhodes, 120 feet high, built by Chares, B. C. 288, occupying twelve years in making. It stood across the harbor of Rhodes sixty-six years, and was then thrown down by an earthquake. It was bought by a Jew from the Saracens, who loaded nine hundred camels with the brass.

2. The Pyramids of Egypt. The largest engaged 360,000 workmen, was thirty years building, and has now stood three thousand years.

3. The Aqueducts of Rome, invented by Appius Claudius, the Censor.

4. The Labyrinth of Psammeticus, on the banks of the Nile, containing within one continued wall, one thousand houses, and twelve royal palaces, all covered with marble, having only one entrance. The building contained three thousand chambers, and a hall built of marble, adorned with statues of numerous gods.

5. The Pharos of Alexandria, a tower built by order of Ptolemy Philadelphus, in the year 282 B. C. It was erected as a lighthouse, and contained magnificent galleries of marble, a large lantern at the top, the light of which was seen one hundred miles distant; mirrors of enormous size were fixed round the galleries, reflecting everything on the sea. A common tower is erected in its place.

6. The Walls of Babylon, built by order of Semiramis, or Nebuchadnezzar, and finished in one year, by 200,000 men. They were of immense thickness.

7. The Temple of Diana, at Ephesus, completed in the reign of Servius, sixth king of Rome. It was 450 feet long, 200 feet broad, and supported by 126 marble pillars, 70 feet high. The beams and doors were of cedar, the rest of the timber, cypress. It was destroyed by fire, B. C. 365.

THE LANTERN.

It is perhaps not generally known, that we are indebted to Alfred the Great for the invention of that useful article, the lantern. In the life of Alfred, by Asserius, we have the following account:

Before the invention of clocks, Alfred caused six tapers to be made for his daily use; each taper, containing twelve pennyweights of wax, was twelve inches long, and of proportionate breadth. The whole length was divided into twelve parts, of which three would burn for one hour, so that each taper will be consumed in four hours; and the six tapers being lighted one after another, lasted twenty-four hours. But the wind blowing through the chinks of the walls of the chapel, or through the cloth of his tent, in which they were burning, wasted these tapers, and consequently they burnt with no regularity; he therefore designed a lantern, made of ox or cow horn, cut into thin plates, in which he enclosed the tapers, and thus protecting them from the wind, the period of their burning became a matter of comparative certainty.

PIN HEADING.

[From the London Mec. Magazine.]

The process of pin-heading, three establishments for which I visited, is carried on in the following way:—A large room is filled with small tables, at each of which sit four children, about thirty or forty together in a room, and certainly of ages lower than I should suppose it possible could be employed in any other gainful occupation. The majority of those I saw, did not appear to be above seven or eight; and in fact, the scene, as far as regards the ages of the children, reminded me more of an infant school, than anything else I had ever witnessed. A sort of frame is fixed before each child, on which is suspended a heavy weight, which is kept in perpetual motion by the child pressing its foot on a treadle beneath the table; and the continual thumping noise of which, close to the infant's ear, seems well calculated to produce the ear ache, complained of by several witnesses. Each child is in a position continually bent in the form of the letter C, its head being about eight inches from the table, and both its hands engaged in taking up the shanks, and putting heads on them, which heads are then tightened by blows from the weight suspended before it. On the whole, the employment of pin-heading seemed to me the most irksome and monotonous, without exception, I had ever witnessed; and knowing the cruelties that are sometimes practised at it, to keep their infants at work, I was not surprised at being told by a manufacturer, that he had been once engaged in the trade, but had left it, owing to the disgust he felt at this part of the business.

NOTES FOR JUNE.

Improved Bee Hives.—The box or hive to be made of inch plank, say about 2 feet 3 inches by 12 inches wide; the upper part of the box to be partitioned off, allowing just space sufficient to admit a drawer of about 10 by 12 inches deep. This drawer is to slide upon the horizontal position, and to be made to fit the inside of the box exactly. In the bottom of the drawer, a hole is to be made, say about one inch and a half in diameter, and a corresponding one in the partition, so as to allow the bees to pass up from the lower part of the hive into the drawer. In the outer side of the drawer, a pane of glass is to be fixed, to ascertain when the drawer is filled with honey. Over the glass a sliding shutter is to be placed, to exclude the light; or the upper end of the plank, forming the

back side of the box or hive, may be sawed off, and fastened with a hinge and button, so as to answer the place of the sliding shutter. When the honey is wanted for use, remove the shutter from before the glass, and having ascertained the drawer is filled, introduce a little smoke into the top of the drawer by means of a tobacco pipe; and when the bees have been driven into the lower part of the hive, separate the drawer and partition; with a case knife, remove the drawer, and having emptied it, return it to its place again, and the bees will commence working in it immediately. By this method the honey will be always pure, without bee-bread or dead bees, and not a single bee need be destroyed; and moreover, it has been tested by many years trial, and found to answer the intention completely.

Mill Wheels and Paddle Wheels.—A writer in a London Journal proposes the application of a *conduit*, to confine the water to the stroke of the paddles of steam-boat wheels, on the same principle as the water is confined within narrow limits in its operation on mill wheels, that the wheel may receive the whole force of the water. The application of this principle to the wheels of steamboats, one great object of which is to be, to prevent the swell caused by the lateral escape of water from the floats, is a thing that will require experiments to testify its utility, which cannot be built upon theoretical analogies.

French Varnish.—Digest in a matrass, in a water bath, two ounces of sandarach, two ounces of gum lac, in a pound of rectified spirit of wine. When the materials are well dissolved, pass the liquor through a cloth, and bottle it. This varnish may be applied to all colors; but before using it, it is indispensable to do over the piece that we would varnish, with a mixture of spirits of turpentine and sandarach, heated together in a glazed earthen vessel. Five parts of sandarach are usually put with eight of turpentine. The varnish should not be applied till the layer of this mixture is quite dry.

Ingenuity.—The other day we saw a machine, performing the work of knitting with far greater facility than ever was done with needles. We have neither room nor ability to describe it as its ingenious construction deserves. One can but wonder at the agility with which fingers of steel act so nimbly, and at the same time operate so exactly, in effecting the most delicate operations.

India Rubber Coffins.—Coffins are now beginning to be made of this article, which it is said will preserve the body better than leaden coffins, and answer the general purpose.

To Clean Files.—Sometimes the teeth of a file, which is yet good, become clogged with particles of iron, copper or wood, and while in that state, it can no longer be used. To clear it, make a lie of ashes; keep the file in it for a few moments, then dry it by the fire, and rub it with a stiff brush. Potash dissolved in warm water will answer still better.

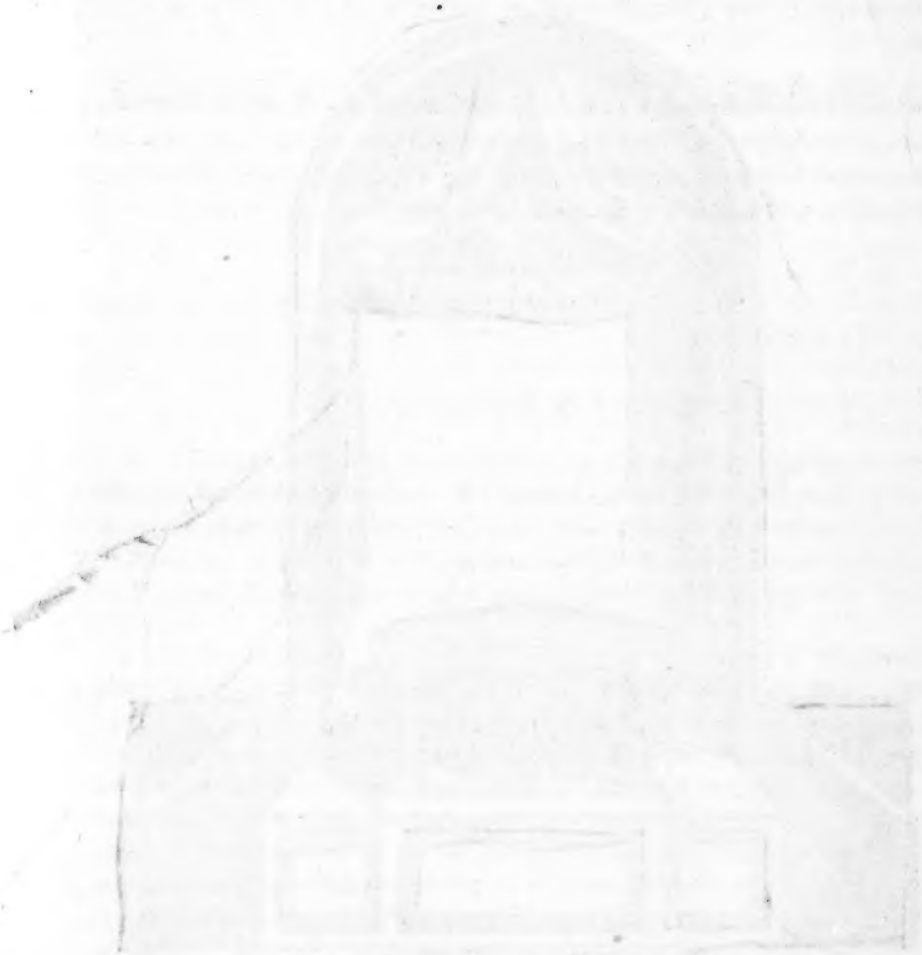
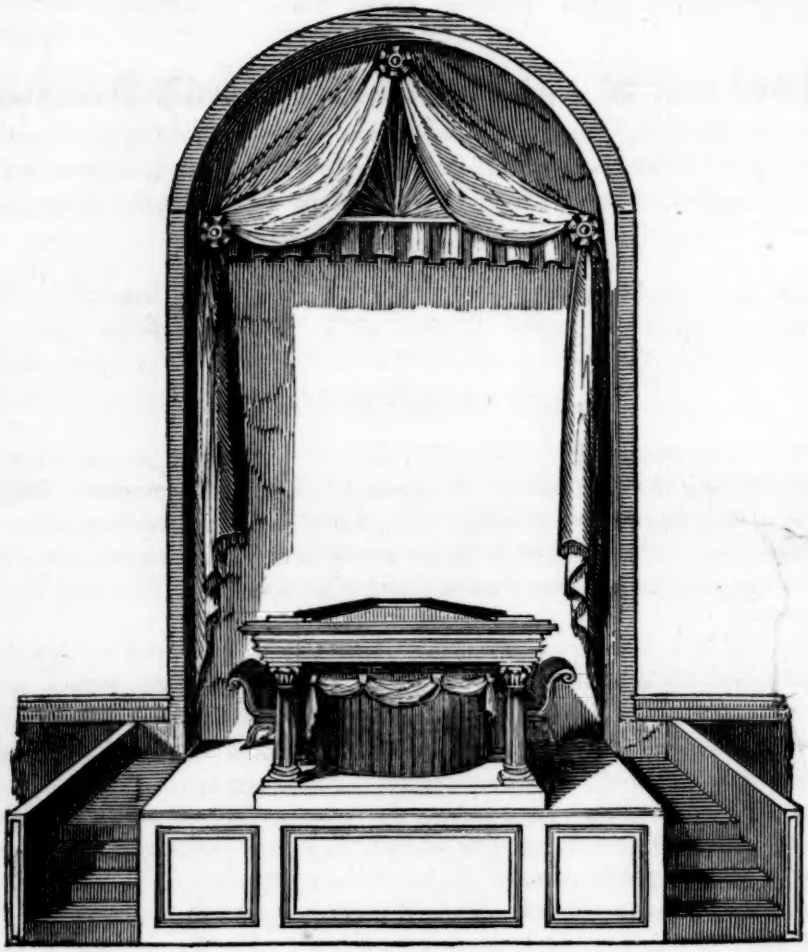
Scarlet Dye for Ivory and Bone.—Take a gallon of lie of wood ashes, and a pound of Brazil wood; add two pounds of copper filings or chips, and a pound of alum. Boil them together for half an hour. Pour off the liquor, and put into it the objects you wish to stain.

The Thames Tunnel.—It appears that the excavating of the tunnel has been renewed, and it is likely that, unless unforeseen accidents should prevent, it will this time be completed. A large sum has been advanced by Government to help it along.

New Oil.—At the South, an oil has been made of cotton seed, said to be every way equal to sperm oil. The flame is whiter and purer, and is less apt to smoke, and when it does smoke, the odor is not offensive. When the whales are all killed, this will be a most valuable resort.

Aloes Ropes.—On trial, at Paris, ropes made from the aloes plant from Algiers, have been found stronger than those of hemp. Of two cables of equal size, the one of aloes sustained 2,000 kilogrammes, but the hemp cable only 400 kilogrammes.

Preservation from Rust.—Polished instruments of iron and steel have been preserved many months from rust, by keeping them in solutions of potash and soda. A very small quantity of alkali is sufficient. Lime water, diluted with its own weight of water, answers the same purpose.

Use of Knowledge.—Of old, cobalt was regarded by miners as such an annoyance in their operations, when found among the ores, that there was a *prayer* used in the German churches, that God would preserve miners from *cobalt* and evil spirits. This terrible mineral is one of the most valuable and permanent blue paints.

Lithography.—In Brussels, lithography has been successfully employed in printing table covers and carpets.